

International Regional Comparative Study Living Lab Project Group 1

Resolving Inequality in Education Using AI Technology

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Introduction

Group 1 of the 'International Regional Comparative Study' Living Lab prepared a presentation under the theme of "Resolving Inequality in Education Using AI Technology." We started the study focusing on quality education guarantees, and in the process, the data showed that the number of students who do not have a basic academic background in the national academic achievement evaluation increased, and the difference in the participation rate of students who depend on private education and private education by income level increased. Through this figure, we concluded that inequality in education is currently occurring in the Korean education system.

Academic achievement assessment

The definition of academic achievement assessment is a test that is conducted to improve the quality of school education by identifying how well students understand what they have learned in school and reflecting it in the next curriculum. The goal of the academic achievement assessment is to set the test targets for the third year of middle school and the second year of high school, which are about to enter high

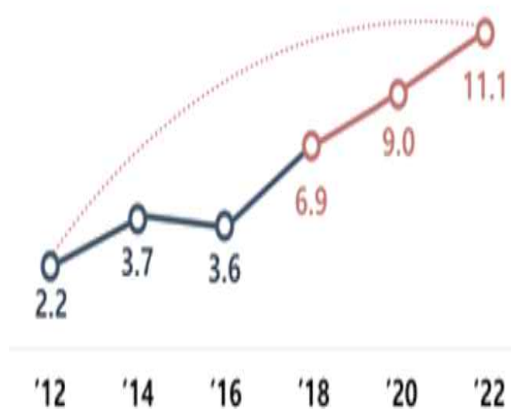
school and university, to help identify the individual's objective level and design career paths. The results of the academic achievement assessment are divided into levels 4, 3, 2, and 1, with the lowest level being level 1. And students who have received level 1 are defined as those who do not have basic academic ability.

Problem Identification

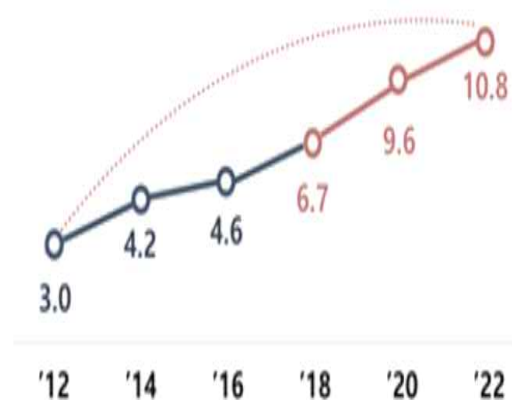
Through statistical data, we will explain the social problem of an increase in the number of students who do not have a basic academic background, dependence on private education, and the difference in the participation rate of private education by income level. The proportion of first-level students in the three subjects of state-owned enterprises is steadily increasing. In particular, as of 2022, 13.2% of the third graders of middle school and 15% of the second graders of high school are at level 1, showing that the most problematic subjects are level 1. The trend of changes in the average value of the three subjects of state-owned enterprises. In this graph, it can also be seen that the level 1 ratio is upwardly oriented, and comparing the changes in the periods 12-16 and 17-22 shows a sharp rise in the latter period.

First, the decline in basic learning abilities among students in Korea can be attributed to the free semester system. A private university professor in Seoul pointed out that while progressive education policies like the free semester system offer new experiences to students, they might also lead to a decline in academic background. The Ministry of Education has partially acknowledged this issue, noting

that the gap between discussion-oriented education and traditional multiple-choice tests can result in a lack of basic academic skills. Second, the COVID-19 pandemic is a major reason for the decline in basic academic abilities. A national academic achievement assessment in 2023 showed a significant drop compared to pre-pandemic levels in 2019. The percentage of students with above-average abilities decreased, while the percentage of underachievers increased. This decline is attributed to the loss of interest and understanding due to changes in the learning environment, including restrictions on face-to-face classes and the shift to remote learning.



Changes in the proportion of students lacking basic academic level in Middle school 3rd grade



Changes in the proportion of students with average academic level in High school 2nd grade

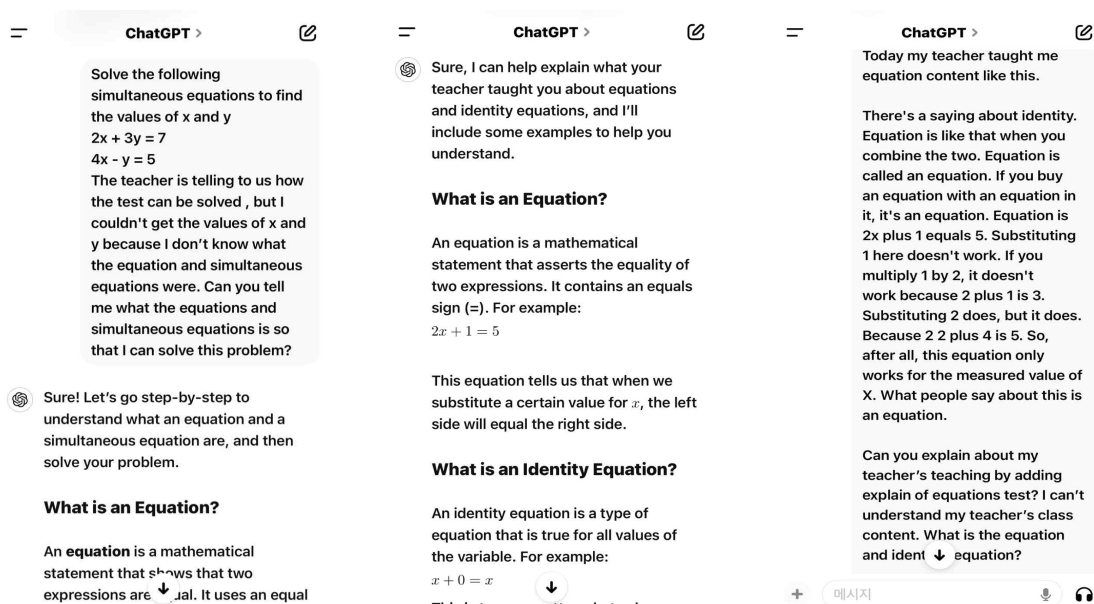
Problem Solving and Experimental Planning

The Next is the description of the experimental plan for the solution. First, the class participating in the Living Lab experiment is evaluated for academic achievement at the beginning of the semester. As soon as the semester begins, the teacher makes the students in the experimental class create a new Google account and subscribe to

GPT-4o Plus. In each class, the teacher will record the class progress in real time and receive a textured version of the recorded content through an app function called Clova Note. In each class, the teacher has time to have GPT-4o enter the text of the class the students received, and each student has time to ask GPT-4o what they did not understand in the teacher's class. In addition, the teacher allows students to check through GPT-4o to see to what extent they understand the class themselves. For instance, if students ask GPT-4o to create problems in basic, application, advanced, and application-intensive stages based on the class content we entered, the students will be able to understand what level of learning they have and what level of learning study they need more while solving the problems provided by GPT-4o. In this way, the GPT-4o-based teaching method mentioned above is conducted to the experimental class for 1st and 2nd semesters. The experimental class that has completed the 1st and 2nd semesters will be evaluated for academic achievement again. Finally, the Living Lab experiment is to end by comparing the level of academic achievement evaluation received by class students before and after the Living Lab experiment to see if the Living Lab experiment was effective. We wanted to select one of the third graders of middle school in Wonju to participate in this experiment. The reason for this is that it seemed unreasonable to proceed with the experiment because the high school grades were directly related to the entrance examination. It was thought that if the basic academic ability was well established in the third year of middle school, not only the students who did not have the basic academic ability of middle school but also the students who did not have the basic academic ability of high school students could be reduced. Since the experimental

budget has to provide a paid version of GPT-4o to all students in one class, the paid version price of 29,000 won and the number of classes were set at about 725,000 won. The experimental period is approximately one year, during which the experimental class will take the academic achievement test before the Living Lab experiment in 2025, receive lessons using GPT-4o during the first and second semesters of 2025, and then take the academic achievement test again in March 2026.

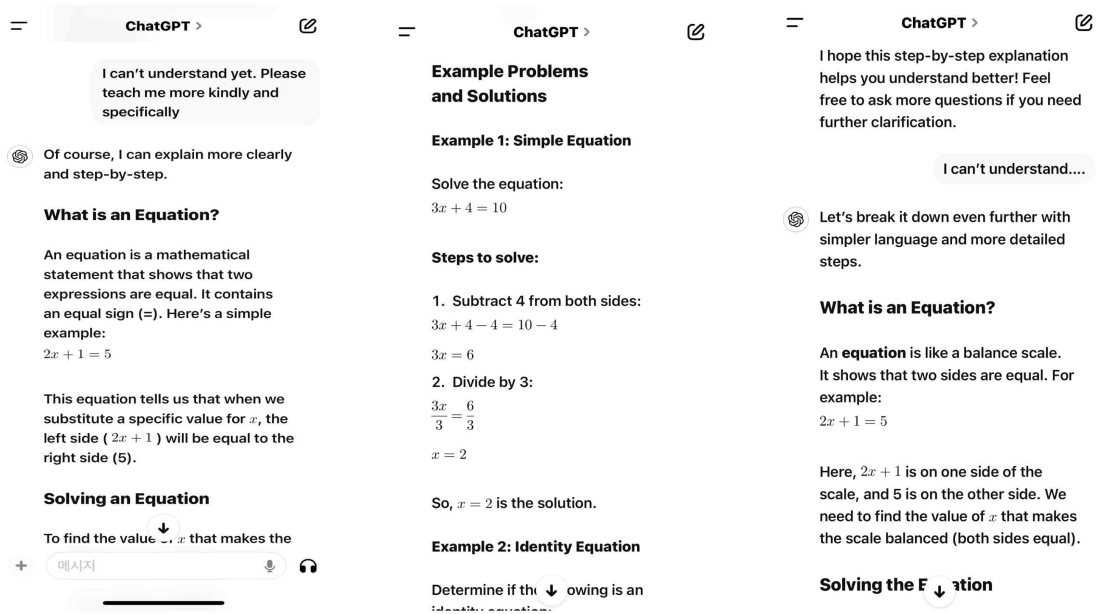
How GPT-4o react when the user says do not know what the equations are



The pictures from the far left are from GPT-4o, who gave him a lecture on the theory of equations on YouTube and asked him to explain the equations again based on the class we told him. Based on the teacher's class content that GPT-4o told us, it explained what the equations and identity are, and we confirmed that they gave us additional explanations with more examples. The picture on the far left is a picture of me asking GPT-4o, assuming that we are underachieving students who are taking a class to solve a problem of the equations but do not know what the equations are

or even what the equations are.

How GPT-4o react when the user says he or she cannot understand



Results and Implications

This is the expected conclusion of the experiment. The experiment concludes that learning levels will improve as the proportion of students without a basic academic background decreases. If the Living Lab effect is recognized, it will be expanded beyond Wonju, enhancing quality education and reducing the educational gap nationwide. AI-based achievement evaluations will enable customized learning, boosting academic performance and reducing educational inequality. This approach aligns with sustainable development goals, promoting individual growth and societal sustainability.